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CIGUATERA FISH POISONING IN THE PACIFIC

INTRODUCTION

Ciguatera fish poisoning is a significant public health problem in the Pacific and a potential barrier to further development of small scale commercial fisheries in the Pacific islands. In recent years, over 3,000 cases of fish poisoning (Figure 1) have been reported annually to the South Pacific Epidemiological and Health Information Service (SPEHIS). It is estimated that this total represents only 10-20% of the actual number of cases of fish poisoning, which would therefore be in the order of 15,000 to 30,000 cases annually. Though death from ciguatera fish poisoning is rare, illness can be severe and recovery slow. Publicity on cases of fish poisoning can result in a decline in the consumption of fresh fish in island communities and problems in exporting fresh fish to foreign markets.

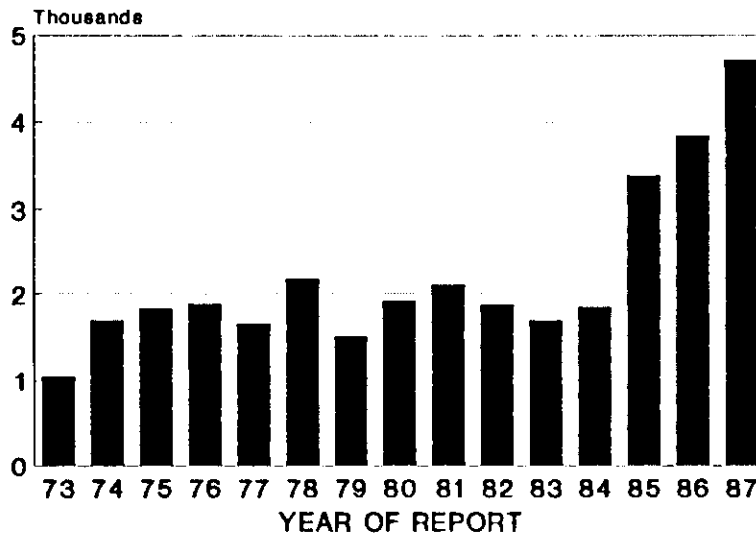


Figure 1. Fish poisoning cases reported to SPEHIS - 1973 to 1987

Fish poisoning can result from eating spoiled fish or from eating fresh or processed fish containing naturally occurring toxic substances. Ciguatera fish poisoning results from eating reef fish that have previously consumed toxic dinoflagellates (microscopic marine organisms) or from eating predators of these reef fish. There are several types of fish poisoning in addition to ciguatera. Some are associated with specific fish, for example clupeoid poisoning (sardines, anchovies or herring) and puffer fish poisoning. Scombroid fish poisoning occurs when certain types of fish (mackerels and tunas) are eaten after they have produced toxins through spoilage, usually because of inadequate chilling and refrigeration.

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CLINICAL SYMPTOMS

The major clinical symptoms that have been associated with ciguatera fish poisoning are described in Table 1. Symptoms usually appear within two to thirty hours, with an average of about six hours, after the consumption of toxic fish, and may vary with the individual and the species, the quantity and parts of the fish consumed. Usually the first symptoms to appear are numbness with a prickling sensation around the lips, tongue and throat, and general weakness and nausea.

Table 1: Clinical Symptoms Associated with Ciguatera Fish Poisoning (adapted from Hokama, 1988)

Category	Symptoms
Digestive	Nausea, often followed by symptoms of watery diarrhoea, abdominal cramps and sometimes vomiting that usually subside within 24 hours. Symptoms may cause dehydration.
Neurological	Initially, sensitivity disturbances such as reversal of temperature sensation, where cold feels hot (a burning or tingling sensation may also be felt) and hot feels cold, intense itching and numbness with tingling in the limbs. Severe cases may exhibit partial paralysis, convulsions, shaking and spasms. Neurological symptoms may persist from weeks to months (rarely years).
Cardiovascular	Slow or accelerated pulse rate that is often irregular. Reduced blood pressure. Heart beats may be slightly muffled. These symptoms generally disappear in 2-3 days.
General	General weakness, joint pain, muscle pain (especially of the legs) headache, chills, sweating and dizziness.

The usual progression of the illness is shown in Figure 2. There seems to be a dose-response relationship in ciguatera fish poisoning, with increased ingestion of toxic fish causing more severe symptoms. The illness may last for weeks or months, and occasionally years, depending on the severity of the symptoms. Repeat cases are usually more severe.

Death from ciguatera fish poisoning occurs in less than one per cent of the cases and is usually associated with consumption of the most toxic parts of fish (liver, viscera, organs, roe, etc.). Reported causes of death include respiratory and heart failure and shock from severe dehydration due to vomiting and diarrhoea.

TREATMENT

In most cases, people with ciguatera fish poisoning recover completely, and treatment of the symptoms is usually sufficient to ensure recovery. Individuals with ciguatera fish poisoning should avoid consuming any fresh or saltwater fish or shellfish products, alcoholic beverages and nut or seed products. Consumption of these foods can cause a relapse in symptoms, and increase the severity and/or duration of the illness. This observed syndrome may be due to chemical substances in these foods which mimic the fish poisoning toxins, thus causing a type of allergic reaction.

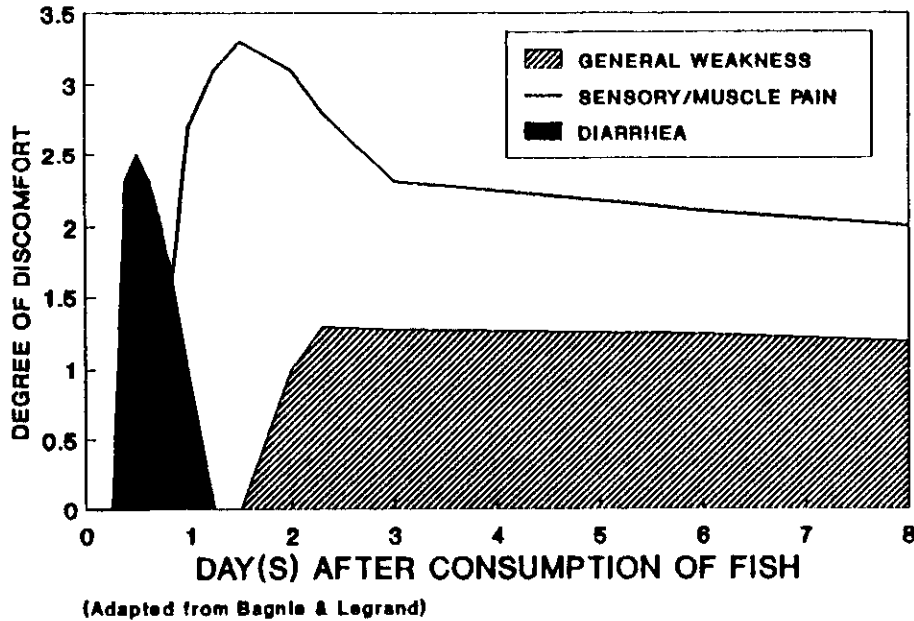


Figure 2. Severity and duration of ciguatera symptoms

Efforts are being made to develop a possible curative treatment for ciguatera fish poisoning. A recent article by Dr. Palafox *et al*, in the *Journal of the American Medical Association*, reports that mannitol, an inexpensive sugar compound widely used to help the flow of urine, may be an effective treatment for acute ciguatera fish poisoning. Mannitol may work by flushing out fish poisoning toxins from the body through the urine. Studies to confirm the effectiveness of mannitol are in progress.

CAUSATIVE AGENT OF CIGUATERA FISH POISONING

Ciguatera fish poisoning is associated with several polyether toxins, of which ciguatoxin is probably the most important, especially in carnivorous fish and in toxic fish found to cause ciguatera. Toxic *Gambierdiscus toxicus* is the source of introduction of ciguatoxin into the food chain, leading to human fish poisoning. These dinoflagellates attach themselves to marine algae and are then passed up the food chain by being consumed by small herbivorous fish, which are then consumed by carnivorous fish. Humans are poisoned after consumption of either type of toxic fish.

Ciguatoxin is one of the most potent and stable marine toxins known. It is resistant to heat and acid, and cannot be destroyed by cooking, smoking, marinating, freezing, drying, salting or freeze drying.

Ciguatoxin and other related toxins do not alter the smell, taste or colouration of the toxic fish tissues. The ciguatoxin concentrates in the liver, viscera, organs, roe and head of the fish, which feel no ill effects from the toxin. The higher fish are in the food chain, the more concentrated is the toxin in their tissues and the more severe the symptoms from eating the fish.

FISH SPECIES IMPLICATED IN CIGUATERA FISH POISONING

In theory, almost any reef fish or predator to reef fish could become ciguatoxic under the right conditions. In the Pacific the majority of the implicated fish are carnivorous and include:

- groupers or rock cods
- parrot fish
- surgeon fish
- emperor fish
- snappers
- jack, trevallies or carangs
- mullets
- trigger fish
- wrasses
- barracudas
- moray eels

Several factors may affect the toxicity of the fish. These include:

- the area fished (less important for migratory species);
- whether the fish is herbivorous or carnivorous - carnivorous fish are generally more toxic;
- the size and weight of the fish (carnivorous) - larger, heavier fish are generally more toxic.

PREVENTION AND CONTROL OF CIGUATERA FISH POISONING

Local surveillance of fish poisoning is a key element in the prevention and control of ciguatera. More complete reporting of fish poisoning cases should be encouraged through the training of reporting sources (such as medical staff at clinics and hospitals who provide urgent care) on the diagnosis of the various types of fish poisoning and the reporting procedures to local health officials. All outbreaks of fish poisoning and, when staff and budgetary resources allow, individual cases of fish poisoning should be investigated. These investigations are important in determining the type of fish poisoning involved (ciguatera vs. scombroid, etc), the number of people affected, the species of fish consumed, and where the fish was caught.

The information gathered through fish poisoning surveillance can be used in the development of ciguatera control methods. These methods might include prohibiting the sale of fish species that are known to often be toxic, that are caught in known 'hot spots' on the reef, or that are over a certain weight. Other methods include public education on ciguatera fish poisoning (especially in the avoidance of eating the viscera and roe (eggs) of fish) and in future, the screening of toxic fish. The choice of methods used will depend on the local patterns of ciguatera fish poisoning.

SOUTH PACIFIC COMMISSION ACTIVITIES ON CIGUATERA

The SPC Epidemiology Programme published a handbook on fish poisoning in the Pacific in 1973 and organised meetings of the Expert Ciguatera Committee in 1981 and 1983. Recently the Epidemiology Programme collaborated with the SPC Fisheries Programme in the ciguatera workshop held during the Twentieth Regional Technical Meeting on Fisheries (Noumea, New Caledonia, 1-5 August 1988). The meeting recommended that:

- the poke stick test used for ciguatoxin screening be evaluated by appropriate laboratories in the Pacific area;
- the SPC Health and Fisheries Programmes compile a concise practical manual to aid in the clinical diagnosis of various types of fish poisoning in the Pacific;
- the SPC encourage and support national programmes to improve the diagnosis and formal notification of cases of fish poisoning.

Produced by Francois Bach, Epidemiologist
and Steven Terrell-Perica, Health Surveys Epidemiologist

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